Confidence in NIE-65 Production Statistics

Necessity for Statistical Confidence Limits

A statistical series of illusory confidence and precision would be conveyed by the presentation of single figure estimates for various Soviet economic activities. Furthermore, as analysis proceeds into more highly aggregated magnitudes, precise estimates have even less validity. A more reliable presentation is achieved by recasting each estimate to reflect the relative degree of confidence in that particular figure. This improved technique finds expression in the form of varying ranges of error for each estimate. Statistical analysis would require that confidence limits of this nature be derived from extensive investigation of samples of varying size. Since available data are inadequate to fulfill such a requirement, the ranges applied to absolute estimates are subjective judgments which evaluate the relative reliability of estimates.

Margins of Error for Absolute Estimates

The margins of error for absolute 1951 estimates on individual commodities or services were submitted by the analysts who had made the original production estimates. In order to aid in standardizing the basis for their judgments a relative reliability scale was established by Analysis Division. This scale provides for ranges of ± 5 percent, ± 10 percent, ± 25 percent, and greater than ± 25 percent. The analysts were not required to set their margins of error precisely at any one of these points on the scale, but could set them between points and could have varying ranges on the plus and minus sides as well. The graduations in the scale were only intended to serve as a basis for quantitative judgment.

In the process of aggregating the error estimates of margins of error submitted by the commodity analysts, it was necessary to adjust some of the estimates which did not conform to the criteria employed in the reliability scale. The basis for reclassification of this estimate of margins of error was the documentations submitted for the ORR Contribution to NIE-65.

In the ± 5 percent category fall estimates of homogeneous commodities and services for which either postwar plan data exist in absolute terms, or estimates exist that can be checked by serial number analysis. The ± 10 percent group contains those items for which plan information in the form of ratios related to base periods is available, for which estimates can be made from plan data available on items with similar technical coefficients, or for which aggregations have been made on the basis of detailed analysis. In the ± 25 percent group are estimates based on studies of requirements, those aggregated from non-exhaustive basic detail (plant studies), and those representing components computed as constant percentages of a known aggregate over a period in which percentages probably varied. The greater than ± 25 percent of error group contains estimates of items for which current information is weak or non-existent. For setting margins of error on the 1957 extrapolated estimates the ranges in each point on the scale were raised by 5 percent.

All of the basic items entering into NIE-65 are classified below by the estimated ranges of error for the 1951 estimates. For purpose of simplification a reliability scale has been devised in which A = ± 5 percent error or less, B = ± 5 to ± 10 percent error, C = ± 10 to ± 25 percent error, and D = greater than ± 25 percent error.

	USSR Estimates	Bloc Estimates
Transportation Index		
Railroads	B	C
Water Transport (Internal)	B	C
Communications Index		
Telephone Subscription	B	C
Long-Distance Phone Calls	B	C
Telegrams	B	C
Industrial and Agricultural Branches		
Electric Power Index		
Electric Power Generation	A	B
Solid Fuels Index		
Anthracite and Bituminous Coal	A	B
Lignite	A	A
Peat	A	-
POL Index		
Crude Oil	A	B
Natural Gas	B	B
Ferrous Metals Index		
Manganese	B	B
Molybdenum	B	C
Tungsten	B	B
Metallurgical Coke	B	B
Pig Iron	A	B
Rolled Steel	A	B
Vanadium	C	C
Cobalt	C	-
Non-Ferrous Metals Index		
Bauxite	B	B
Platinum Group	C	-
Tin	C	-
Fluorspar	C	C
Primary Copper	B	B
Secondary Copper	B	B
Primary Aluminum	B	B
Secondary Aluminum	B	B
Lead, Refined	B	C
Zinc, Refined	B	C

	USSR Estimates	Bloc Estimates
Shipbuilding Index		
Merchant Ships	C	D
Bearings Index		
Ball and Roller Bearings	C	C
Construction Equipment Index		
Excavators	C	-
Automotive Equipment Index		
Trucks	B	B
Passenger Cars	C	B
Tractors	B	B
Electrical Machinery Index		
Turbine Production (steam, hydro)	C	C
Motors (electrical)	C	C
Generators (electrical)	C	C
Power and Distribution Transformers	C	C
Electric Lamps	C	C
Electronic Equipment Index		
Radio and Television Receivers	C	C
Electron Tubes	C	C
Telephone and Telegraph Equipment	D	D
Professional Electronic Equipment	C	C
Electronic Components	C	C
Electrical & Electronic Test Equipment	C	C
Railway Equipment Index		
Steam Locomotives	B	B
Electric Locomotives	B	C
Diesel Locomotives	C	-
Freight Cars and Parts	B	C
Railway Passenger Cars and Parts	C	-
Metalworking Machinery Index		
Metalworking Machinery (other than machine tools)	D	-

	USSR Estimates	Bloc Estimates
Agricultural Machinery Index		
Tractor Plows (moldboard type)	B	C
Combines	B	C
Tractor Seed Drills	B	C
Tractor cultivators	B	C
Mining Machinery Index		
Coal Cutters	C	C
Coal Combines	C	C
Coal Loaders	C	C
Mining Locomotives (Coal)	C	-
Textile Machinery Index		
Looms	C	-
Spindles	C	-
Machine Tools Index		
Machine Tools	C	C
Chemicals Index		
Rubber Tires	B	B
Reclaimed Rubber	B	B
Sulfuric Acid	B	B
Nitric Acid	B	B
Ammonia, Synthetic	B	B
Caustic Soda	B	B
Chlorine	B	B
Calcium Carbide	A	A
Benzol, Refined	C	C
Toluol	C	C
Phenol, Refined	C	C
Cresols	C	C
Xylol	D	D
Naphthalene	C	C
Synthetic Rubber	B	B
Construction Materials Index		
Gypsum	C	-
Asbestos	C	-
Cement	B	D
Unglazed Brick	B	B
Flat Glass	C	-

Forestry Products Index	USSR Estimates	Bloc Estimates
Timber (pitprops)	C	C
Timber (pulpwood)	C	C
Softwood Lumber (sawn)	B	B
Hardwood Lumber (sawn)	B	B
Plywood	C	C
Fuelwood	C	C
Woodpulp (mechanical)	C	C
Woodpulp (chemical)	C	C
Paper Products (other papers)	C	C
Paper Products (newsprint)	C	C
Paper Products (paper board)	C	C
Food Processing Industry Index		
Fish Catch	B	B
Meat Production	B	B
Sugar (raw value)	B	B
Vegetable Oils	B	B
Animal Fats	B	B
Light and Textile Industry Index		
Cotton Yarn Production	B	B
Wool Yarn Production	B	B
Rayon Production	B	B
Boots and Shoes Production	B	B
Defense Industry Index	C	C
Food Crops and Livestock Index		
Bread Grains	B	B
Other Grains	B	B
Rice	B	B
Potatoes	B	B
Horses	B	B
Sheep and Goats	B	B
Cattle	B	B
Hogs	B	B
Industrial Crops Index		
Cotton Lint	B	B
Wool	B	B
Hemp Fiber	B	B
Silk	B	B
Flax	B	B

Margins of Error for Aggregate Estimates

The margins of error estimated by D/M, D/I, and D/S analysts have been aggregated into margins of error for the broad sectors-industry, agriculture, transportation and communication. The procedure followed is analogous to that used to convert industrial and agricultural branch indexes into sector indexes.* The results of this procedure yield a range of about ± 10 percent for 1951 USSR industry estimates, and a range of about ± 15 percent for the extrapolated 1957 USSR estimates. The ranges of error on items included in the index only by imputation would run higher than the average for the explicit portion of industry. Inclusion of the error ranges of the imputed items would raise the general industry range of error by an undetermined amount. In terms of growth, the aggregated margins of error indicate a rise in USSR industrial production of between 45 and 60 percent from 1952 to 1957, or a growth rate of 7 - 9 percent per annum.

A similar procedure was followed to derive aggregate ranges of error for 1951 and 1957 Bloc sector estimates. They are higher in both years because of the lower statistical confidence in Satllite production estimates. For 1951 the Bloc industry range of error stands at about ± 12 percent and for 1957 at about ± 16 percent.

The derivation of a range of error for gross national product is analogous to the procedure of obtaining indexes of gross national product from sector indexes. For the USSR the range of error for 1951 GNP amounts to about ± 12 percent and for 1957 to about ± 18 percent. In terms of growth a rise in GNP of between 25 and 40 percent is indicated, a growth rate of 4.5 to 7 percent per annum.

No ranges of errors have been calculated for Bloc gross national product estimates as no precise indexes were calculated for the report. They would probably be about 5 percent higher than for comparable USSR estimates.

* See Appendix C, ORR Contribution to NIE-65, for description of techniques.